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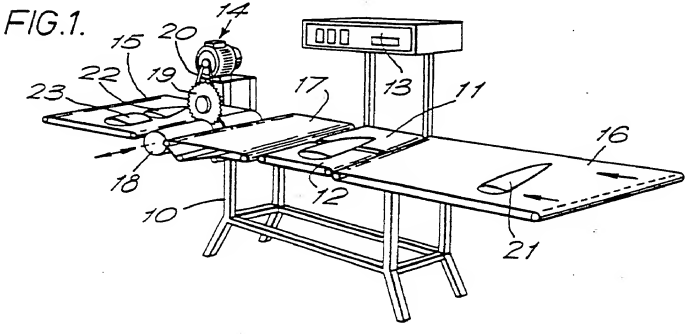
(54) **Apparatus for cutting meat or fish.**

(57) An apparatus for the automatic cutting of meat or fish material comprising a pair of adjacent parallel conveyors (11, 12), two weighing machines, a control device (13) and a transversely movable cutting device (19). The control device (13) determines the displacement of the cutting device (19) so that a predetermined constant weight is cut off.

FIG.1.



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Apparatus for cutting meat or fish

The present invention relates to an apparatus and a process for the automatic cutting of meat or fish to produce portions of a perdetermined constant weight.

In the production of packaged frozen meat or fish products, it is important that the weight of the portions is controlled as accurately as possible, otherwise the weights will vary at the time of filling the packages resulting in certain disadvantages : underweight portions of incorrect weight have to be rejected leading to significant losses of fish or meat material while overweight portions have to be adjusted to the correct weight, which increases the costs.

The most reliable way of ensuring a constant weight is by cutting and weighing the portions manually. However, this is labour intensive and very time-consuming. Mechanical means for automatic and semi-automatic cutting and weighing of portions have been described but these generally involve the use of very complex machinery. For example, the use of photoelectric sensors has been proposed to detect the linear measurements of fish but since not only the length, but also the breadth and thickness vary appreciably, this method would not lead to the cutting of portions with an accurate constant weight.

In our co-pending European Patent Application No. 86102704.3 we have described and claimed an apparatus and process for the automatic cutting of meat or fish material to produce portions of a predetermined constant weight, comprising a pair of adjacent parallel conveyors suitable for transporting a meat or fish material lying partly on each conveyor, a weighing machine and a movable cutting device characterised in that the parallel conveyors are adapted to travel in the same direction at substantially the same speed and that at least part of one of the parallel conveyors is adapted to form the load-bearing platform of the weighing machine, the weighing maching being adapted to weigh the material on the load-bearing platform and the cutting device being adapted to move transversely relative to the direction of movement of the conveyors, the direction and distance of the transverse movement being controlled by the weight recorded on the weighing maching, and then to cut the material parallel to the direction of movement.

This method is very reliable provided that the thickness of the meat or fish material does not vary too much. However, when there are wide variations in the thickness of the meat or fish pieces, it is rather difficult to maintain a constant weight.

We have now developed an improvement to this apparatus and method which, surprisingly, enables fish and meat pieces having widely varying thicknesses to be cut automatically to a predetermined constant weight.

Accordingly the present invention provides an apparatus for the automatic cutting of meat or fish material to produce portions of a predetermined constant weight, comprising a pair of adjacent parallel conveyors suitable for transporting a meat or fish material lying partly on each conveyor, two weighing machines, a control device and a movable cutting device characterised in that the parallel conveyors are adapted to travel in the same direction at substantially the same speed and that each of the parallel conveyors is adapted to form the load-bearing platform of one weighing machine respectively, each weighing machine being adapted to weigh the material on the respective load-bearing platform so that the weight of the whole material as well as the portion required is measured, and the cutting device being positioned downstream of the adjacent parallel conveyors and adapted to move transversely relative to the direction of movement of the conveyors, the direction and distance of the transverse movement being controlled relative to the weights recorded on the weighing machines, by means of the control device, and then to cut the material parallel to the direction of movement.

The adjacent parallel conveyors are conveniently endless belts. Conveniently, each of these belts is fixed to the weighing machine via the axles of the rollers.

The adjacent parallel conveyors are preferably separated by a short distance so that there is a gap between them. The presence of this gap helps to eliminate the weight influence caused by any vertical or horizontal change of distance, or any speed difference between the two conveyors. The product has a natural elasticity and the elastic zone of the product in the gap between the two conveyors helps to eliminate this weight influence. Generally, the width of the gap may conveniently be from about 20 to 70 mm, more usually from 25 to 60 mm, preferably from 30 to 55 mm and especially from 35 to 51 mm. The optimum width of the gap depends a great deal on how precisely the mechanical construction of the weighing system has been effected and, clearly, a very precisely manufactured unit will be able to record a more accurate weight with a narrow gap than with a wide gap between the conveyors.

Advantageously, positioned upstream of the pair of adjacent parallel conveyors, there is an infeed conveyor, for example, an endless belt and, positioned between the pair of adjacent parallel conveyors and the cutting device, there may be an intermediate conveyor which may also be an endless belt.

The weighing machines are conveniently of the type consisting of continuously working scales based on load cells and are preferably spring balances. The measurements of the total weight and the partial weight of the portion required are recorded and fed to the control device, e.g. a computer, which is programmed by means of a factor to move the cutting device. The movement of the cutting device may be achieved by a motor which is actuated by the computer and which causes the cutting device to move in either direction transversely before stopping in the appropriate position to cut the meat or fish material at the correct point. Although any kind of cutting means may be used, for example, jet cutting, a circular saw is preferred.

A further conveyor is conveniently provided immediately after the cutting device to transport the cut material away.

The present invention also provides a process for the automatic cutting of meat or fish material to produce portions of a predetermined constant weight which comprises placing a meat or fish material onto the infeed end of a pair of adjacent parallel conveyors travelling in the same direction substantially at the same speed so that the material lies partly on each conveyor, each conveyor being adapted to form the loadbearing platform of one weighing machine respectively which record the weight of the whole material as well as the weight of the portion required advancing on the loadbearing platforms, which measurements are fed to a control device, after which the material is cut by a movable cutting device adapted to move transversely relative to the direction of movement of the conveyors, the direction and distance of the transverse movement being controlled by the weight recorded on the weighing machine by means of the control device.

The meat or fish material is conveniently placed manually on an infeed conveyor positioned upstream of the adjacent parallel conveyors. Advantageously, the desired approximate weight of that part of the material which will form the portion having a predetermined weight should lie substantially on one of the adjacent parallel conveyors, and this may conveniently be achieved by ensuring that the material contacts a fixed guide fitted in the appropriate position above the infeed conveyor.

After having been weighed the meat or fish material passes to an intermediate conveyor where it is collected before being cut.

The present invention is applicable to meat and fish materials of all sizes and shapes, and with widely varying thicknesses, for example cod or salmon. The invention is particularly suitable for cutting cod tails having a weight between about 100 g to 175 g.

The present invention will now be illustrated by way of example with reference to the accompanying drawings in which Figure 1 represents a perspective view of the apparatus and Figure 2 represents a top plan view of the apparatus.

Referring to the drawings, the apparatus comprises a supporting frame 10, parallel endless belts 11 and 12 separated by a gap of 40 mm width, each of which forms the load bearing platform of a check weighing machine (not shown) computed with a computer, a weight recording unit 13, a movable cutting unit 14 and an endless belt 15. Upstream of endless belts 11, 12 is an infeed belt 16, and downstream of endless belts 11, 12 is an intermediate belt 17. The movable cutting unit comprises a roller 18 capable of moving back and forth in the direction of the arrow together with a circular saw 19 driven with a belt 20. The back and forth movement of the cutting unit is controlled by a step motor (not shown).

In operation, fillets of cod 21 are placed manually onto the infeed belt 16 in such a position that when a fillet reaches the parallel belts 11 and 12 at the infeed end approximately 120 g of the tail end lies on the belt 11. This is achieved by placing the fillet so that the end of the tail of each fillet touches a fixed guiding bar (not shown) fitted above the belt 16. The cod fillets 21 advance in the direction of the arrows and on reaching the belts 11 and 12 the weight of the whole fillet and the weight of the tail end is recorded. This information is fed to the computer which is programmed by means of a factor to actuate the step motor which causes the movable cutting unit 14 to travel the appropriate distance transversely to the direction of movement of the parallel belts 11 and 12 so that the cutter is in the correct position for cutting the cod fillets which, in the meantime have passed from belts 11, 12 to the intermediate belt 17 where they are collected while the cutting unit is travelling to the appropriate position. On traversing the roller 18 the cod fillets are cut to give tail portions 22 each weighing 120 g which are separated from the remaining cod fillet 23 whereupon the separated portions advance to the endless belt 15 where they are transported away for further processing.

Claims

1. An apparatus for the automatic cutting of meat or fish material to produce portions of a predetermined constant weight, comprising a pair of adjacent parallel conveyors suitable for transporting a meat or fish material lying partly on each conveyor, two weighing machines, a control device and a movable cutting device characterised in that the parallel conveyors are adapted to travel in the same direction at substantially the same speed and that each of the parallel conveyors is adapted to form the load-bearing platform of one weighing machine respectively, each weighing machine being adapted to weigh the material on the respective load-bearing platform so that the weight of the whole material as well as the portion required is measured, and the cutting device being positioned downstream of the adjacent parallel conveyors and adapted to move transversely relative to the direction of movement of the conveyors, the direction and distance of the transverse movement being controlled relative to the weights recorded on the weighing machines, by the control device, and then to cut the material parallel to the direction of movement.

2. An apparatus according to claim 1 characterised in that the adjacent parallel conveyors are separated by a short distance so that there is a gap between them.

3. An apparatus according to claim 2 characterised in that the width of the gap is from 30 to 55 mm.

4. An apparatus according to claim 1 characterised in that positioned upstream of the pair of adjacent parallel conveyors is an infeed conveyor.

5. An apparatus according to claim 1 characterised in that positioned between the pair of adjacent parallel conveyors and the cutting device is an intermediate conveyor.

6. An apparatus according to claim 1 characterised in that the cutting device comprises a circular saw.

7. An apparatus according to claim 1 characterised in that the control device is a computer.

8. A process for the automatic cutting of meat or fish material to produce portions of a predetermined constant weight which comprises placing a meat or fish material onto the infeed end of a pair of adjacent parallel conveyors travelling in the same direction substantially at the same speed so that the material lies partly on each conveyor, each conveyor being adapted to form the load-bearing platform of one weighing machine respectively which record the weight of the whole material as well as the weight of the portion required, advancing on the load-bearing platforms which measurements are fed to a control device, after which the material is cut by a movable cutting device adapted to move transversely relative to the direction of movement of the conveyors, the direction and distance of the transverse movement being controlled by the weight recorded on the weighing machine by means of the control device.

9. A process according to claim 8 characterised in that the meat or fish material is placed manually on an infeed conveyor positioned upstream of the adjacent parallel conveyors.

10. A process according to claim 9 characterised in that it is ensured that the material contacts a fixed guide fitted in the appropriate position above the infeed conveyor to ensure that the desired approximate weight of that part of the material which will form the portion having the predetermined weight will lie substantially on one of the adjacent parallel conveyors.

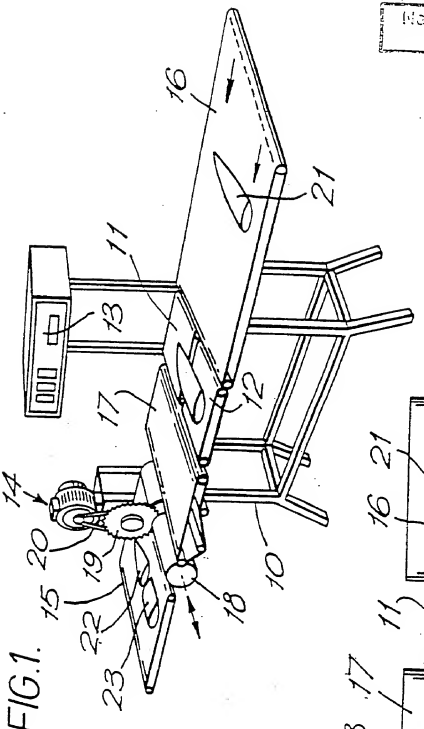


FIG.1.

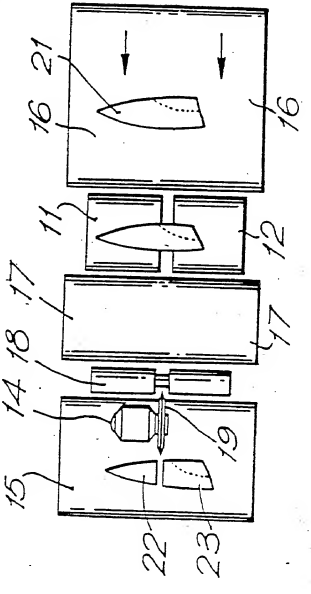
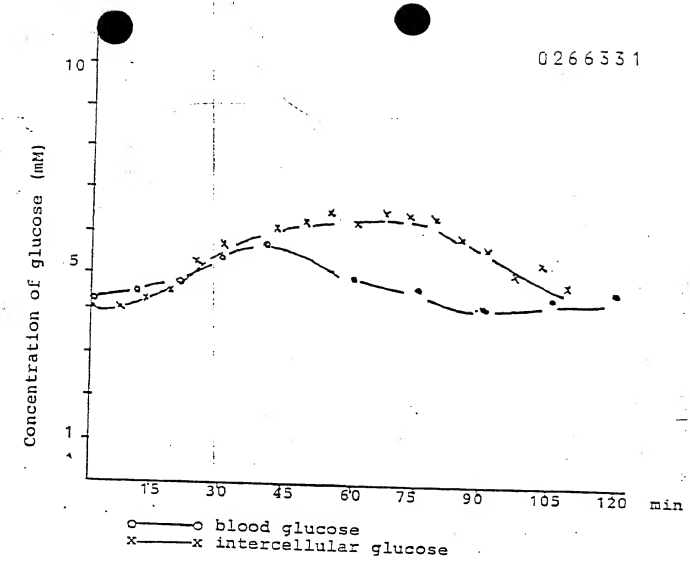


FIG.2.



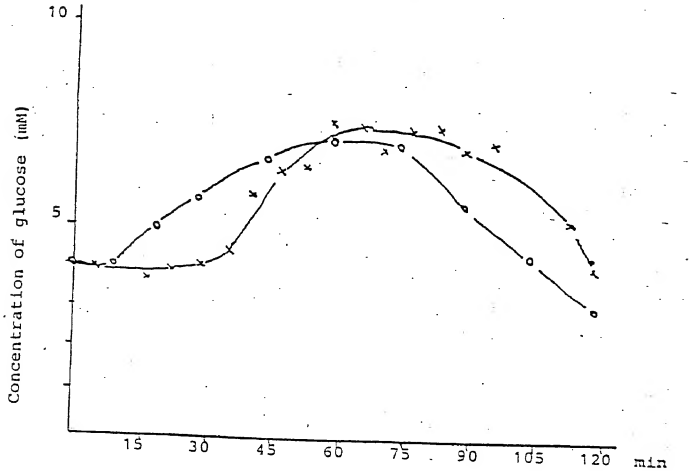


FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 86 11 5182

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	GB-A-2 149 650 (WHITEHOUSE) * The whole document *	1,8	B 26 D 7/30
A	US-A-2 799 043 (WALKER)		
A	US-A-2 541 046 (FONKEN)		
A	DE-A-3 106 185 (FEDOROVIC)		
A	DE-B-2 644 024 (WENZEL)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 26 D
A 22 C
G 01 G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	08-07-1987	BERGHMANS H.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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